UNIVERSITI TEKNOLOGI MARA

CHEMICALLY PRODUCED OF ACTIVATED CARBON FROM PALM KERNEL SHELL FOR RADIOACTIVE IODINE SCRUBBING

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of the requirements for the degree of
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CONFIRMATION B Y PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 11th January 2016 to conduct the final examination of Mohamad Azman Bin Che Mat Isa on his Master of Science thesis entitled "Chemically Produced of Activated Carbon from Palm Kernel Shell for Radioactive Iodine Scrubbing" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examniners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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ABSTRACT

The biggest biomass source in Malaysia comes from oil palm industry. The biggest biomass source in Malaysia comes from oil palm industries. According to the statistic in 2009 Malaysia had approximately 4.75 million hectares of palm oil under cultivation which covers about 60% of the country's agricultural area. Malaysia is the second world`s largest supplier of palm oil after Indonesia (Malaysia Palm Oil Sector, 2012) and Malaysia has supplied 30% of the world demand on palm oil and this trend is set to continue and is projected that the demand is rising by another 5 million (Mn) tonnes annually by 2015. According to the statistic in 2004, therefore; the biomass waste such as palm kernel shell can be used to produce granular adsorbent used for various applications such as for radioactive materials. For that reason, a new type of rotary kiln, called Rocking Kiln – Fluidized Bed (RK – FB) was developed to utilize large amount of the biomass to produce high value added product. Carbon Char or chemically produced activated carbon could be produced by using the kiln. In this research, the adsorbent produced was used to scrub iodine 131. In nuclear power reactor, iodine isotope 131 is produced during nuclear fission, and this elementary radioactive iodine may pollute exhaust air streams that could cause thyroid cancer. For removal of radioactive iodine, normally a potassium iodide – impregnated activated carbon (KI – AC) is used. Thus, a process developed to produce KI – AC and this product produced is to study the performance of to remove the radioactive iodine 131. The results obtained shows that adsorbent produced with the highest BET surface area produced is 1004 m2/g has a high potential to be used in radioactive adsorbing and likely more economics. This research elaborate further the experimental set-up of in Kiln – Fluidized Bed (RK – FB), chemically produced activated carbon, adsorbent quality and radioactive scrubbing process.

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CHAPTER ONE
INTRODUCTION

1.1 RESEARCH BACKGROUND

The biggest biomass source in Malaysia comes from oil palm industries. According to Shafie *et al.*,.(2012), in 2009 Malaysia had approximately 4.75 million hectares of palm oil under cultivation which covers about 60% of the country's agricultural area. Malaysia is the second world's largest supplier of palm oil after Indonesia (Malaysia Palm Oil Sector, 2012) and Malaysia has supplied 30% of the world demand on palm oil and this trend is set to continue and is projected that the demand is rising by another 5 million (Mn) tonnes annually by 2015. Table 1.1 shows the palm oil supply and demand starting from year 2008 to 2012.

Table 1.1
Palm Oil Supply and Demand, 2008-2012 (Mn tonnes)

Country	2008	2009	2010	2011	2012
Indonesia	17.7	21	22.1	23.9	24.9
Malaysia	18.9	17.6	17	18.8	18.7

Source: Italian Trade Agency Report, The Malaysia Palm Oil Sector 2012

Production of crude palm oil, palm kernel, crude palm kernel oil and palm kernel cake in Malaysia for year 2010 to 2011 is tabulated in Table 1.2.

Table 1.2
Summary on the Production of Crude Palm Oil, Palm Kernel, Crude Palm Kernel Oil and Palm Kernel Cake, 2010 to 2011

	2010	2011	Difference Quantity/Value
Planted Area (Hectares)	4,853,766	5,000,109	146,343
Production (Tonnes)			
1. Crude Palm Oil	16,993,717	18,911,520	1,917,803
2. Palm Kernel	4,292,076	4,706,603	414,527
3. Crude Palm Kernel cake	2,014,943	2,144,699	129,756
4. Palm Kernel Cake	2,242,277	2,387,056	144,779

Source: Malaysian Palm Oil Board – Overview , 2012